

Mouse-Derived T Cell Receptor for Use in Immunotherapy

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Keywords: vaccine, cancer, immunotherapy, T-Cell Receptor, cancer testes antigen (CTA), placenta, NY-ESO-1

Summary:

The [Surgery Branch](#) of the National Cancer Institute (NCI) is seeking statements of capability or interest from parties interested in collaborative research to further develop, evaluate, or commercialize vaccines for immunotherapy.

Technology:

Scientists at the NCI developed a T cell receptor (TCR) derived from mouse T cells (i.e., murine TCR) that can be expressed in human T cells to recognize the cancer testis antigen (CTA), NY-ESO-1, with high specificity. This anti-NY-ESO-1 TCR has murine variable regions that recognize the NY-ESO-1 epitope and murine constant regions. The inventors performed *in vitro* studies comparing this murine NY-ESO-1 TCR with a previously developed human NY-ESO-1 TCR counterpart, which yielded promising clinical outcomes in patients with a variety of cancers. The murine TCR functioned similarly to the human counterpart in their ability to recognize and react to NY-ESO-1 tumor targets.

NY-ESO-1 is a CTA that is expressed only on tumor cells and germline cells of the testis and placenta. CTAs are ideal targets for developing cancer immunotherapeutics, such as anti-CTA TCRs, since these TCRs are expected to target cancer cells without harming normal tissues and thereby minimize the harsh side effects associated with other types of cancer treatment. NY-ESO-1 is expressed on a wide variety of cancers, including but not limited to breast, lung, prostate, thyroid, and ovarian cancers, melanoma, and synovial sarcomas, so this technology should be applicable in adoptive cell transfer therapies for many types of cancer.

Potential Commercial Applications:

- Personalized immunotherapy with high probability for mediating tumor regression in patients with cancers expressing NY-ESO-1;
- Component of a combination immunotherapy regimen consisting of a variety of immune receptors and other immune molecules (cytokines, etc.) targeting multiple tumor antigens;
- Research tool to investigate the progression and metastasis of NY-ESO-1-expressing cancers in mouse models;
- *In vitro* diagnostic tool to identify cancer tissues that express the NY-ESO-1 cancer testis antigen.

Competitive Advantages:

- Predicted high probability of clinical success: Murine TCRs from this invention exhibited similar *in vitro* properties to a human NY-ESO-1 TCR that has mediated tumor regression in many patients in a recent clinical trial.
- Lower toxicity than other cancer treatments: NYESO-1 is overexpressed on a wide variety of cancers, but not on any normal human tissues that could be reactive with an engineered TCR.
- TCRs engineered to recognize NY-ESO-1 could be utilized as an immunotherapy for many different cancers.

Development Stage: Discovery, *in vitro* data available.

Patent Status: U.S. Provisional Application No. 61/650,020 filed 22 May 2012.

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Related Technologies: HHS Reference No. **E-304-2006** and HHS Reference No. **E-312-2007/1**

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